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ECONOMIC IMPACT DUE TO THE DEVELOPMENT OF REGIONAL AIRPORT – A CASE STUDY OF MERSING AIRPORT

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Abstract

Mersing is a small town on the east coast of Johor, Malaysia. This region has a very high potential tourism development due to its role as the gateway to the tropical islands off the east coast of the Malaysian Peninsular.Mersing is also the southern gateway to the Enadau-Rompin National Park. Mersing itself also has its own attractiveness and could be developed into a vibrant town on its own, but now the development is curtailed by certan factors such as its remoteness and transport and communication difficulties. Improving the connectivity to Mersing is a key factor for economic development of Mersing and its surrounding areas. This study found that the overall development of Mersing is directly linked to the development of transportation and connectivity to the town, especially the development of the Mersing Airport (Lapangan Terbang Mersing, LTM). Primary data was collected by two methods; firstly interviews with authorities and parties directly linked to aviation and airports, the local authorities and corporates that are interested parties to development of airports in Malasyia and Mersing; and secondly by questionaire survey of opinions of local popuplations and tourists visiting Mersing. The results show that the respondents positively support the development of Mersing Airport. The potential economic impactsdue to the airport development to serve Mersing are categorisedinto two parts,the direct impact and the indirect impact. The estimation of the impacts is based on the number of movementsof aircrafts per day and the type of aircraft at the LTM. The mitigating impacts on the environment and other infrastructure development in the region were also looked into.

Keywords: *small airport development, runway, airport terminal,economic impact, tourism*

1. Introduction

Malaysia continues its development especially its infrastructure which include the development of airports. The developments of infrasturcture would then help in improving other sectors such as industry, agriculture and the services sector including tourism. The improvement of communication and transport infrastructure wouldalso boost downstream economic impacts, especially the local urban employment and economy(Cassidy & Brown, 2010; Freestone & Wiesel, 2009).

Mersing is a coastal town on the east coast of Malaysia peninsula, with a population of 21,000. It is a crossroad for tourism to go to the various islands of the South China Sea (great snorkeling and diving, sea views, beautiful beaches), and the Endau-Rompin National Park (tropical jungle and natural environment). Mersing and the surrounding area itself have their own charms in beautiful beaches (town's beach, Air Papan, Penyabung), great angling spots and quaint cultures dominated by the life of the fishing folks(Wikivoyage, 2017). There is now a training centre for sailing sports in Tanjung Resang, about 20 km north of the town.

Presently, the only way to reach Mersing is by road transport.The road network system in peninsular Malaysiais well developed, and there are no other modes of transport available for Mersing.Other than private vehicles, thepublic transport system of express buses and taxis are well established.By road transport the remoteness of Mersing means the travel would take a long journey time and is very tiring. The travel time to Mersing from Kuala Lumpur, Kuantan, Singapore and Johor bahru by road would be 6, 2.5, 3.5 and 2 hours respecetively. Their distances to Mersing are 450, 197, 170 and 139 km respectively.

Mersing and the surrounding areas are not served with rail trasport at all. Thus other than road transport, the only alternative is to travel to and from Mersing by air. The problem is, Mersing has a small airport, with only a grass strip of 500 m long (250 m reserve at each end). This airport is only suitable for small general aviation aircrafts capable of carrying less than 12 passengers. Some suitable aircrafts for LTM now is listed in the Appendix.

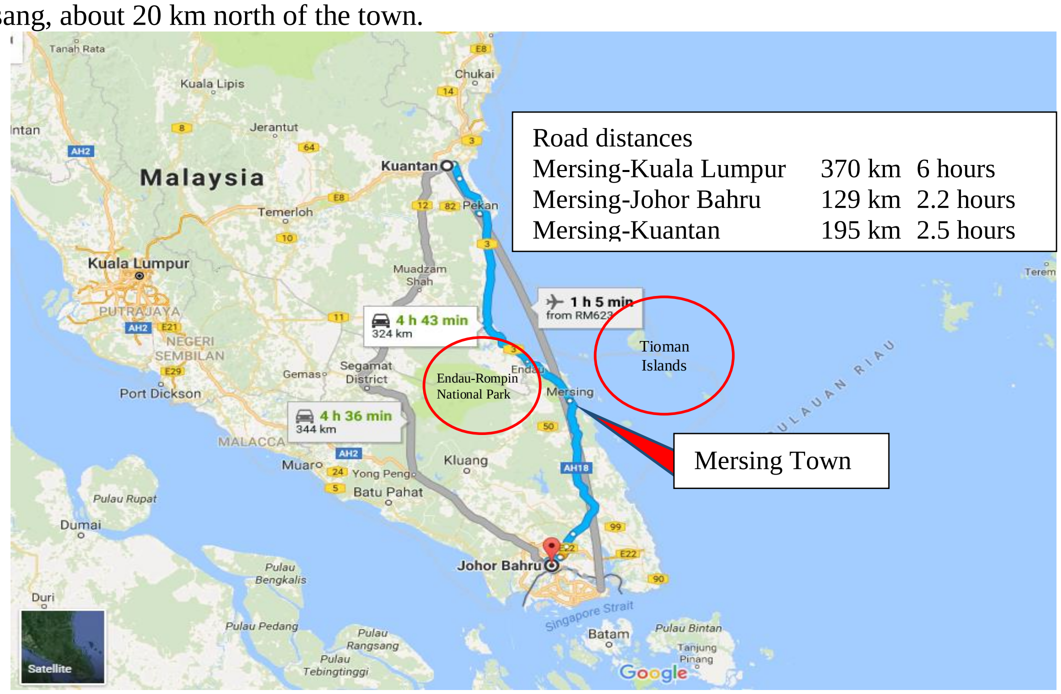


Figure 1. Map showing location of Mersing on the East coast of Johor, and the land route to Johor Bahru and Kuantan.

Economic development of a region is always related to the infrastructure needs of the community in that region, including the development of airports. Airports can be a catalyst to economic development of the region, but it has to be able to attract a critical mass of air transport services to that airport. If not, the project cost to develop the aiport can be considered as an inefficient capital expenditure. It is always a fine line between spending for theoverall development of the area to the inefficeint capital spending.

There are evidences from the USA that airports in cities with expanding population are able to retain the air services, while others need special incentive programmes (ASIP, Airport Services Incentive Programme is a US govenrment programme to attract airlines to matginal airports) to retain the airline services. Cities with stagnant populations generally will not be able to recruit and retain airline services to their airports (Ryerson, 2016). Expanding population basically promises more passengers for the airlines and better local economic prospects which will result in better affordability to purchase air transport services.

In Malaysia, the advent of air transport deregulation, the introdcution of Low Cost Carriers (LCC) had markedly increased the demand for air transportation, and thus the demand for airline to serve more airports, especially to small cities that were never serve by air transportation before.

In a multiple airport scenario, the airport that gives good services would influence passengers to use it, although distance plays the most important role in their choice(Harvey, 1987; Innes & Doucet, 1990). In any case, Mersing would have a big catchment area, as the nearest airports are 136 km (Senai International, and 194 km (Kuantan Airport) away(Innes & Doucet, 1990; Suzuki, et al., 2003).

According to the Department of Civil Aviation Malaysia(DCAM), which is the organization responsible for the management of air transport in Malaysia, there are a total of 62 airports in Malaysia, of which 38 are in operation for scheduled air services.The military uses13 others, although some airports were of shared use by the military and civilians. Therest are utilised as general use, such as for pilot training, general aviation, air navigation, recreation flying, and emergency reserve airports. There are also small private airports that are not registered with the DCAM, but are in use continuously, such as for agriculture aviation stations, and for flying clubs.

Theutilization of airports throughout the world is increasing for the biggest airports, while it is decreasing for small airports. A small airport is defined by International Air Transport Association (IATA) and Airports Council International (ACI) to be airports that handle less than 1 million passengers per year (Regan, 2017; Lian & Rønnevik, 2011).

The general development in a region can be a contributing factor for other industry to develop. As example a tourist attraction in a region will cause transport services to increase and the increase in transportation services can bring in more people. Thus, other businesses such as hotels and restaurants, local transport services and other related indutries would expand to cater for the increased arrivals to the area(Hakfoort, et al., 2001).

This is happening right now in the East coast of Johor. There are now investments in the tourism industry led by Khazanah in Desa Rhu (Oxford Business Group, 2016) and a potential RM190m investment for Tioman Airport and Marina project on Tioman island(World Wildlife Fund Malaysia, 2004).There is also a government expenditure of RM10m nad RM34m to improve the jetty and water supply in Tioman respectively, that would impact the tourism industry positively(Bernama, 2017; Radzi, 2015). On the negative side the WWF considers the airport and marina project in Tioman to be detrimental to the natural environment (World Wildlife Fund Malaysia, 2004).

Within all these plans, it is very surprising that there is no plan for Mersing, not even a strategic plan from the development authority of East Coast Economic Region (ECERDC, 2016).

In the oil and gas inductry, the Pengerang Integrated Petroleum Complex (PIPC) involved an investment of RM60b (Oxford Business Group, 2016). in 10 years starting in 2014.

This paper discusses the potential impacts of developing the Mersing Airport into an airport capable of serving passenger aircrafts from airports around the region, including from Singapore and Indonesia.

2. Research approach

The approach use for this study is structured interviews with stakeholders and quantitative questionaire research method among the public, including tourists in the town of Mersing.

The latter is sometimes more popularly known as statistical study where the number of samples are determined before the questionnaire are distributed to the targeted area. The questionnaires were developed and direct-field survey was carried out.

The former method is a case study type in which qualitative and descriptive research would studythe responses of individual respondentin-depth. Usually a small group of people or participants is enough to give good results to the research (Rosmariati,2015). Although a small pool is considered, the indepth study of their responses, conclusions could be drawnas emotions and context could be captured. Moreover, this research requires the responses of people who know the subject matter, in relation to their work, rather than just as an incidental stake-holder. This method could also be exploratory; to address the “how” and “why” questions(Smith & Holmes, 2009).

The population of Mersing district is about 70,894(Census Survey, 2005) with 21,670reported to live in Mersing town in 2009(Tourism Johor, 2015). It was reported that Johor received 4.6 m visitors in 2015, but no figures for Mersing could be found (Radzi, 2015).AS such the population of Mersing town is considered the population for this survey. Thus the number of sample for the survey should be378 based on Krejcie & Morgan(1970)sample size determination table for 95% confidence and 5% error. But the survey only manages to gather 130 local respondents and 70 tourist respondents. This response rate means the margin of error becomes 6.82% which is acceptable.

The primary data for this study is obtained from two main parts. The first part is by statistical survey by using questionnaires distributed to two main groups, namely residence of Mersing and visitors of Mersing. The second part of the data gathered through in-depth interviews.

The statistical survey was conducted mainly to know the opinion of respondents on the current mode of transportations to and from Mersing, the need for future air transportation for Mersing and the possible economic impact of improved air travel to the region.

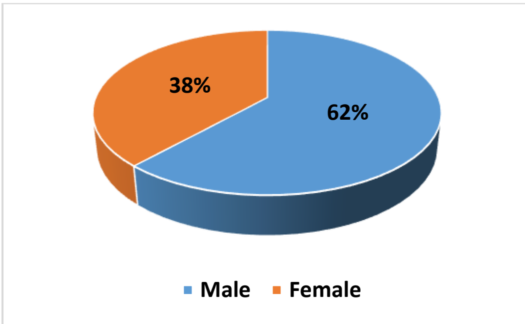
3. Results on public survey, development planning and economic impact

Part A of the survey determined the generality of the respondents, based on their gender, age and nationality. Their resindential status was also determined. The results are shown in Figure 2.

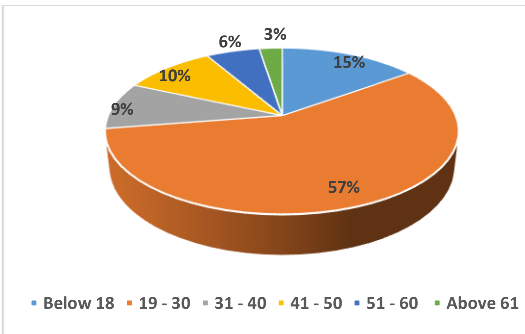
Part B probes the traveling habits of the respondents namely their normal mode of transport when traveling, their destination and their frequency of travel. Figure 3 shows the result of this part of the survey.

These results may help in planning what kind of airport would be suitable for Mersing. The survey shows that 54% of the respondents travel out of Mersing. If this is translated to the whole of Mersing district population it would translate to 37,800 people travelling anually. Of these, 35% travel more than 10 times a year, and another 33% travel 2 to 5 times a year. These would translate to more than 25,000 passenger movements per year. And if 20% of these are willing to utilise air transport if available, then this would give more than 5000 passengers, for the airlines.This are only from the local community.

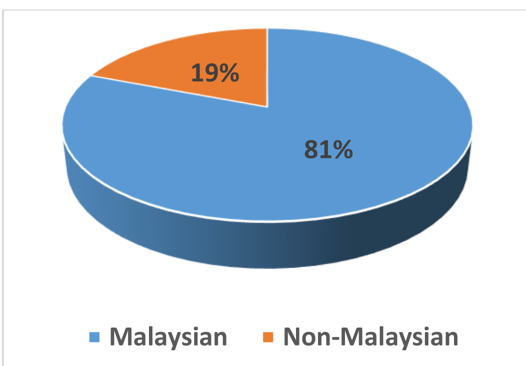
Part C of the survey questions the respondent on their knowledge and preference of travel traits. The respondents answer the question based on a Likert Scale of 1 to 5; specifically “1-Strongly Disagree, 2-Disagree, 3-Neither, 4-Agree, 5-Strongly Agree”. When asked on their satisfaction level of the present tranport system, the mean result is 3.5, which shows that they, on average, are not satisfied.



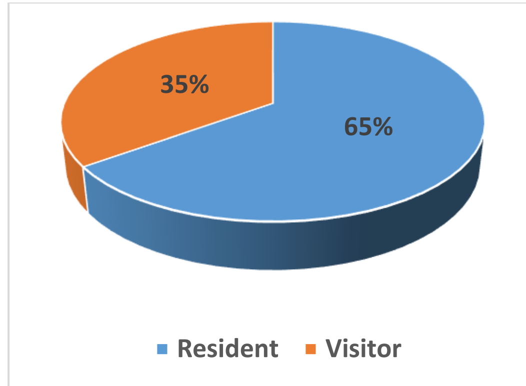
a) Gender



b) Age

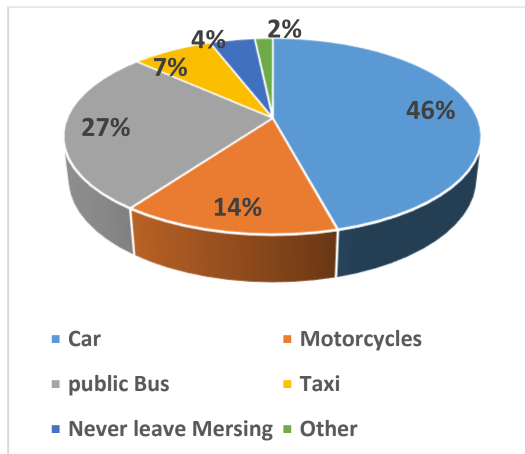


c) Nationality

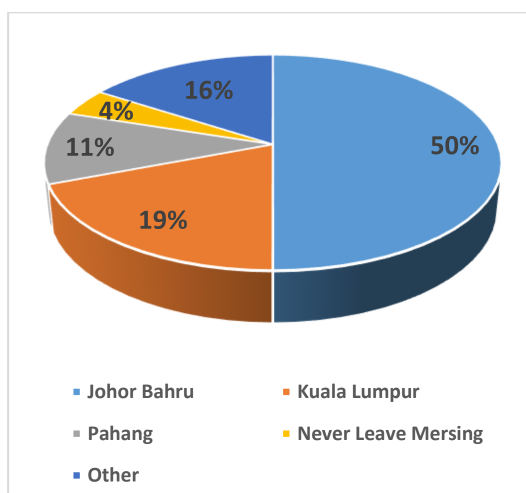


d) Residential status

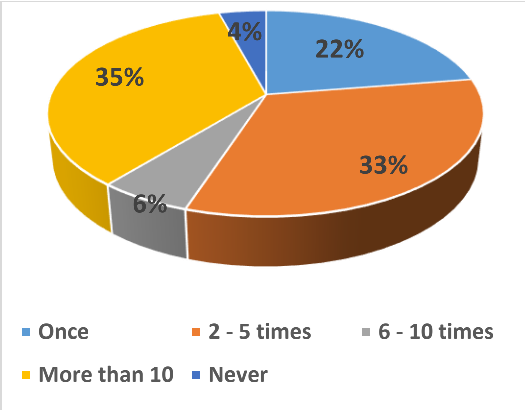
Figure 2: Characteristics of respondents (a) gender, (b) age, (c) Nationallity, and (d) residential status in Mersing.



a) Mode of transport coming in or going out of Mersing



b) Most frequent destination



c) Frequency of travel

Figure 3: Traveling habit of the respondents (a) Mode of transport coming in or going out of Mersing, (b) Most frequent destinations, and (c) Frequency of travel

The second question probes the respondents on the need of a future air tranport in Mersing. The mean result is 2.7 which shows that they have no real opinion on airtrasportaion system for Mersing. This is understandable as they had not really experienced air travel.

The third question asked the respondents to gauge the economic impact on the region if an airport is built in Mersing. The mean result is 4.2 which shows that they strongly agree that the airport would bring in great economic benefit to the residents of Mersing. They foresee that a new Mersing Airport would increase economic activities in the region creating new jobs and bringing in increased number of tourists.

Part D of the survey consistof 3 open ended questions, based onFinn, et al.(2000).Thequestions and analysis will require the grouping of similar responses and thencategorizing the various descriptions provided by the respondents. The results show that most of the respondents agree that air transportation is essential for Mersing especially to attract more tourists to Mersing.They also agreed that the development of a regional airport will increase economic opportunities and would help in growing the economy of Mersing. Of course the cretion of more tourism products would also increase the tourist number coming to Mersing (Ibrahim & Gill, 2005).

Any airport development has to focus on what type of aircraft that will use the airport and the passenger throughput that the airport will handle. Normally airports are designed for 1, 5, 10, 25 and 50 million passenger movements per year. The type of aircraft will impact the design of the runway, taxiway and aircraft parking apron, while passenger movement would impact the terminal design and capacity. For Mersing, there is now insufficent justification to build airport larger than for 1 m passengers a year,but once there are regular flights, the demand for air travel would increase exponentially. Thus specific plans must be incorporated for subsequent expansionof the airport(Marcucci & Gatta, 2011).

Thus from the current 500 m grass runway, the proposed development would increase the runway length to that which would be able to accommodate the most popular single aisle aircrafts, the B737 and A320(DCA Malaysia, 2015).

4. The engineering aspect of the airport development.

The runway, taxiway and parking apron of the airport has to commensurate with the aircraft that it wants to serve. For a major airport it is easy to decide – just go for the highest specification in everything so that the biggest aircraft could operate from that airport. But for a small airport, the size of the facilities and the loading capacity of the items mentioned have to be optimised.

$$P_a = 2CND$$

Where P_a = annual passenger count,
C = passenger capacity of aircraft,
N = number of flight per day,
D = number of days per year.

For an airport to handle 1 m passengers per year, assuming 5 day week (excluding weekend) and 50 week a year, the number of flight per day is

$$N = \frac{1X10^6}{2X200X(5X50)} = 10.$$

It is expected that the airport should be able to handle 10 aircraft movements, in the class of Boeing 737 and Airbus A320 in a day. This is based on 400 passengers per aircraft - 200 passengersper aircraft capacity X 2 (for arriving and departing passengers). If the weekends were considered as well, the daily frequency needed would be lower.

Thus all the facilities that involved aircrafts, have to be designed for the class stated and for the frequency obtained from the calculations.

For an airport designed for B737/A320 class of aircrafts the runway should be of minimum 45 m wide and 2200 m long with the appopriate strength to support the aircrafts (de Barros & Wirasinghe, 1997). The actual runway length requirement also depends on aircraft weights and air temperature. For this runway, it would be able to accommodate smaller aircrafts such as the Bombardier C100/300, Embraer E175/195, ATR 42/72, Nurtanio N212/219/245, Cessna Caravan, Pilatus 100 and many other regional transport aircrafts.

The long term plan for the airport cannot be forgotten, such that any potential expansion has to be considered. Mainly this involved the land reserve and overall planning of the whole area. New housing should not be allowed to be builtaround/near the airport, as there future conflicts between resindents and the airport may arise due to various things, such as road traffic and aircraft noise issues.

There are also the indirect or secondary economic effects due to the airport expansion. These are mainly increased job opportunities in the service industry to cater to the passengers. These are direct jobs creation at the airport (retail, airport amangements, ground handling of aircrafts) and indirect jobs such taxi operators and accomodation services(Janic, 2008).

Another impact to be considered is the potential for new businesses in the airport such the establishement of aircrafts mainternace, repair and overhaul operations (MRO) and flying and technical training operations. All these do not take into account of the jobs created during the development phase.

5. Conclusions

This work had determined that there is a need for air travel into and out of Mersing. The current transport is only by road which would take a long time and is very tiring. For air service the present airport have to be up-graded, or a new airport has to be constructed.

In Part C of the survey, most of the respeondents see the potential benefits of having airline service in Mersing. Whether they ill be using the air srvice or not, they generally agree to and support the development of an airport in Mersing.

During the interviews, some respondents reserved their enthusiasm as they thought that the air travel service would be more expensive than the land transport. They expressed that they understand that air transport would increase the transport efficiency for Mersing. They were also cognizant that the present airport is not suitable for passenger air services.

The development of the airport itself could be done straight to a standard that it could be utilised by the most popular single aisle narrowbody airliner, the B737 and A320 cklass of aircafts, although it requires large capital. Going straight for this level of investment, the airport could be expected to achieve the servicelevel of 1 million passengers per annum in avery short time.

Otherwise the development could be of multi-phased developments, starting by extending the runway to 1000 m, allowing the airport to serve aircrafts with about 50 passengers, targeting a service level of 250,000 passengers per year. Then when it reaches service saturation, longer runway and bigger terminal has to be built. At every upgrading phase, the airport should target to serve bigger and bigger aircrafts, until it reaches a point that it could serve the B737/A320 class of aircrafts. The advantage of the multi-phase development is that its capital requirement is moderatedthrough each phase, and the utility expectation is moderated by real use. Then the decision to embark on the next phase would be based on the real passenger and aircraft movement data.

The economic impact due to the development of Mersing Airport can be divided in two parts which are the direct impact and indirect impact. Direct impact is the changes of economy that is directly connected to the airport such as the job opportunities within the airport and the aviation industry. The job opportunity estimation was based on the estimationof the number of air movements and type of aircrafts landing at the Mersing Airport.

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Appendix: Aircrafts that could land and take-off from present Mersing Airport

Type	Origin	Design year	Utilsation	No. of Pax	Takeoff distance, ft (m)	Landing dsitance, ft (m)
Antonov An-14	Russia	1958	Transport	8	656 ft (200 m)	985 ft (300 m)
Antonov An-72	Russia	1977	Transport	52	1,312 ft (400 m)	1,148 ft (350 m)
Britten-Norman Defender	UK	1970	Transport	725 kg cargo	1,050 ft (320 m)	995 ft (303 m)
Britten-Norman Islander	UK	1965	Airliner	9	1,100 ft (335 m)	960 ft (293 m)
Conroy Stolifter (Skymaster modified)	US	1968	General Aviation	4	450 ft (137 m)	400 ft (122 m)

Type	Origin	Design year	Utilsation	No. of Pax	Takeoff distance, ft (m)	Landing dsitance, ft (m)
De Havilland Canada DHC-2 Beaver Mk 1	Canada	1947	Transport	6	1,015 ft (309 m)	1,000 ft (305 m)
De Havilland Canada DHC-2 Beaver Mk III	Canada	1947	Transport	6	920 ft (280 m)	870 ft (265 m)
De Havilland Canada DHC-3 Otter	Canada	1951	Transport	10	1,155 ft (352 m)	880 ft (268 m)
De Havilland Canada DHC-6 Twin Otter	Canada	1966	Utility	19/20	1,200 ft (366 m)	1,050 ft (320 m)
De Havilland Canada DHC-4 Caribou	Canada	1959	Transport	32 troops/ 3.63 tons	1,040 ft (317 m)	590 ft (180 m)
De Havilland CanadaDash-7	Canada	1975	Airliner	50	1,200 ft (366 m)	1,050 ft (320 m)
Dornier Do 27	Germany	1955	Utility	6	558 ft (170 m)	525 ft (160 m)
Dornier Do 28	Germany	1959	Utility	7	1,020 ft (311 m)	1,000 ft (305 m)
Evangel 4500	US	1964	Transport	8	1,125 ft (343 m)	1,140 ft (347 m)
Helio Courier H-295	US	1955	Utility	5	610 ft (186 m)	520 ft (158 m)
IAI Arava	Israel	1972	Transport	24	984 ft (300 m)	902 ft (275 m)
Javelin V6 STOL(Piper PA-20 modified)	US	1949	Homebuilt	3	150 ft (46 m)	300 ft (91 m)
Maule M-5	US	1974	Utility	3	550 ft (168 m)	600 ft (183 m)

Type	Origin	Design year	Utilsation	No. of Pax	Takeoff distance, ft (m)	Landing dsitance, ft (m)
PAC P-750 XSTOL	New Zealand	2001	Utility	9	1,196 ft (365 m)	950 ft (290 m)
Peterson 260SE/Wren 460 (Modified Cessna 182)	US	1988	Utility	3	1,000 ft (305 m)	1,000 ft (305 m)
Pilatus PC-6 Porter	Switzerla nd	1959	Utility	10	600 ft (183 m)	550 ft (168 m)
Piper J-3 Cub	US	1938	Utility	2	755 ft (230 m)	885 ft (270 m)
PZL-104 Wilga	Poland	1962	Utility	3	625 ft (191 m)	780 ft (238 m)
PZL-105M	Poland	1989	Utility	5	1,109 ft (338 m)	1,070 ft (326 m)
Quest Kodiak	US	2005	Transport	9	760 ft (232 m)	915 ft (279 m)
Scottish Aviation Pioneer	UK	1947	Transport	4	555 ft (169 m)	660 ft (201 m)
Scottish Aviation Twin Pioneer	UK	1955	Transport	13 troops/ 907 kg	1,071 ft (326 m)	870 ft (265 m)
ShinMaywa US-2	Japan	2007	Air-Sea Rescue	20	920 ft (280 m)	1,080 ft (329 m)
Short SC.7 Skyvan	UK	1963	Transport	19	1,050 ft (320 m)	1,485 ft (453 m)
SIAI-Marchetti FN.333 Riviera	Italy	1952	Amphibian	3	1,400 ft (427 m)	1,100 ft (335 m)
SIAI-Marchetti SM.1019	Italy	1969	Utility	2 pax/ 320 kg	1,185 ft (361 m)	922 ft (281 m)

Type	Origin	Design year	Utilsation	No. of Pax	Takeoff distance, ft (m)	Landing dsitance, ft (m)
Spectrum SA-550 (Modified Cessna Skymaster)	US	1983	Transport	10	675 ft (206 m)	675 ft (206 m)
Slepcev Storch (Fieseler Fi-156 Storch replica)	Serbia	1994	Ultralight	2	126 ft (38 m)	110 ft (34 m)
Westland Lysander	UK	1936	Utility	1	540 ft (165 m)	990 ft (300 m)
Zenith STOL CH 701	US	1986	Trainer	1	1,257 ft (383 m)	1,257 ft (383 m)
Zenith STOL CH 801	US	2011	Homebuilt	3	400 ft (122 m)	300 ft (91 m)